be found sufficient to immerse it quickly under the acid, contained in the beaker (*a*), as shown in Fig. 3, where the induction-tube is seen immersed to within 12 millimetres of its upper surface in water contained in an *insulated* cylindrical vessel (A A′). The inner cavity of the induction-tube is also filled with water to about the same level. By means of wires covered with caoutchouc, except at the lower ends (*p p′*), the discharge from an induction-coil, capable of giving 10 millimetre sparks in air, can be passed through the apparatus. The water in A A′ is maintained as steadily as possible at the temperature of the apartment, and any slight changes in the course of the experiment are noted by means of a delicate thermometer (*t*). The variations of the barometer are also carefully observed. In very exact experiments the surfaces of the induction-tube should be covered with tinfoil, and the cylindrical vessel filled with ice. Before commencing the observation, it will be found convenient, if the temperature has not already effected the adjustment, to expel a little oxygen from the induction-tube, so that the level of the acid may stand somewhere about *b′*. On passing the electrical discharge, the acid will at first be depressed a few millimetres, from the repulsive action of the particles of the electrified gas, but will afterwards steadily rise, and for some time with such rapidity that the ascent of the acid column can be easily followed by the eye. When the current is interrupted, a sudden rise of the acid column will occur equal to the depression which took place on first making connection with the induction coil, after which the new level of the acid may be read.

Another method of obtaining ozone is by the electrolysis of water and of certain acid and saline solutions. The most convenient liquid for this purpose is a mixture of one part of sulphuric acid with six or eight parts of water, and the lower the temperature at which the electrolyte is maintained during the process the greater is the amount of ozone. The simplest and most efficacious arrangement for obtaining ozone by this method is one I have used for many years and exhibited in my lectures. It consists of a bell-jar (Fig. 4, *a*), or glass cylindrical vessel, open below, and contracted to a neck above, which is suspended in a round cell (*b b′*) of porous earthenware, leaving a clear space of two inches between its lower edge and the bottom of the porous cell. The whole is placed in a glass jar (*c c′*) of somewhat larger dimensions than the cell; a bundle of platinum wires (*p*) suspended below the bell-jar serves as the positive pole, and a broad ribbon of platinum (*n n′*) placed between the outer glass jar and the porous cell as the negative pole of a voltaic arrangement of three or four couples. A delivery tube hermetically united to the neck of the bell-jar conveys the mixture of oxygen and ozone disengaged at the positive pole to a sulphuric acid drying tube (*d*). From the desiccating tube the gas passes through the connecting tube (*e*) and thence to other tubes, for the purpose of illustrating the properties of ozone. Thus, in the figure, it is represented as traversing a tube of hard glass (*f f′*) covered with fine wire gauze, and terminating near the surface of mercury contained in the flask (*h*). So long as the gas is heated strongly as it passes through the tubes (*f f′*) by the spirit lamps (*g g′*), not the slightest change is produced upon the mercury; but when the lamps are removed, and the tube allowed to cool, the mercury is rapidly attacked. I ought, perhaps, to mention that all the junctions are made with dry and tightly fitting corks, care being taken that the ends of the connecting tubes project a little beyond the corks. With these precautions the loss of ozone, from its action on the corks, is altogether insignificant.

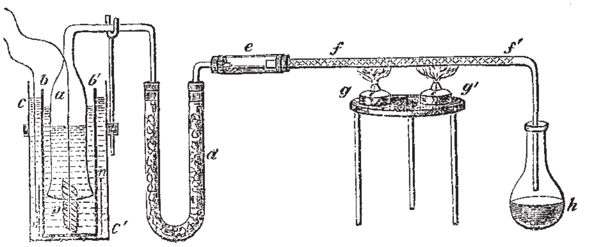

FIG. .

Ozone can also be obtained by the slow oxidation of phosphorus, and of certain ethers and essential oils in presence of moisture.

(*To be continued.*)

NOTES

ONE of the last and one of the best acts of the late Government was to grant a pension of 150*l.* a year on the Civil List to Prof. Sharpey. Dr. Sharpey has done as much as any living teacher for the advancement of physiological knowledge, while his personal worth has secured for him universal respect and esteem.

AT the last monthly meeting of the Russian Imperial Geographical Society M. Venioukoff, the secretary, before proceeding with the business of the evening, said the Society owed a duty which must first be fulfilled, and that was to render homage to the memory of Dr. Livingstone, the importance of whose discoveries and the perseverance of whose labours had placed him in the rank of the most remarkable travellers of all times and of all nations. His biography belonged to the annals of geographical science. M. Venioukoff then read a memoir of Livingstone, which concluded as follows:—"Let England, which may be proud of having given birth to Livingstone, and of having supported him in his labours, learn that among us the merit of her great men can be appreciated." The whole assembly, which was very large, then rose in order to pay a last tribute of respect to the memory of Dr. Livingstone.

THE University of St. Andrew's has conferred upon Mr. J. Gwyn Jeffreys, F.R.S., the honorary degree of LL.D.

WE would draw special attention to the programme, which has just been issued, of a new course of twelve lectures on Zoology, to be delivered during the ensuing spring, in the Zoological Gardens, Regent's Park; the Council of the Society having determined to appropriate the interest of a small bequest which they hold for scientific purposes—the Davis Fund—to the subject. Mr. P. L. Sclater, F.R.S., the Secretary to the Society, will deliver the Introductory Address on April 14; and he will follow it by four lectures *On the Geographical Distribution of Mammals.* After these Mr. A. H. Garrod, the Prosector to the Society, will give five lectures *On the General Classification of the Vertebrata;* and Dr. Carpenter, F.R.S., will conclude the course by giving two *On the Aquarium and its Inhabitants.* The lectures will be delivered on the Tuesdays and Fridays in April and May, at 5 o'clock in the afternoon; they will be free to Fellows of the Society and their friends, and to other visitors to the Gardens. The subjects will be treated in a manner which will make them of general interest, and it is to be hoped that ladies will avail themselves of the opportunity thus afforded, of obtaining information on this too much neglected branch of the great science of Biology.

MR. PHILIP BARNES, who died on Feb. 24, at the age of 82, was one of the oldest Fellows of the Linnean Society. He was a native of Norwich, and a cousin of the Sowerbys. Thirty-four years ago he founded the Royal Botanic Gardens in the Regent's Park, and was the oldest Fellow and father of the Society. A portrait of Mr. Barnes was in the last International Exhibition, and a bust in that of the year before. He was father of Robert Barnes, M.D., and of the late Philip Edward Barnes, the former known in the scientific world by his professional discoveries and writings, and the latter the author of a work on the Belgian Constitution.

THE death, from heart-disease, of Prof. J. F. Holton is announced as having taken place in Everett, Massachusetts, U.S., on the 25th of January. Prof. Holton was well known as a botanist, having devoted many years to the study of the science. He visited South America with special reference to prosecuting his researches in this direction, and studying the relation between the physical geography and the vegetation of the Andes. His somewhat extended sojourn in that country enabled him to collect materials for a work, which was published after his return by Harper and Brothers, and is frequently quoted by botanists.

Mr. William Dunville has presented a valuable endowment in trust for ever to the Queen's College, at Belfast. The endowment consists of two studentships, one for the encouragement of the mathematical and physical and the other for that of natural sciences. They are intended by the donor to enable distinguished students who attained graduation to pursue their collegiate studies further. The studentships are tenable for two years, and are of the value of 45*l.* for the first, and 100*l.* for the second year.

We hear from Cambridge, Massachusetts, that the chair of Zoology held by Professor Agassiz during his lifetime is most probably to be discontinued, and that the teaching he was accustomed to give will, for some time at least, be carried on by Prof. McCrady and Prof. Shaler. Mr. Alexander Agassiz is to be Curator of the Museum, which post being very onerous, prevents him from accepting any professorial work. The new Zoological School at Penikese is also to be under his charge, and we hope that that promising institution will be kept up with vigour notwithstanding the great loss it has sustained in the death of its illustrious founder.

We learn from the *Lancet* that a memorial to Agassiz is in contemplation. At Boston a meeting for the purpose was addressed by Profs. Rogers and Wendell Holmes, after which it was resolved to make the Museum of Zoology at Cambridge—the work of Agassiz's best years—a memorial monument. For this it was proposed to raise the sum of 300,000 dols. to complete its endowment. 65,000 dols. were subscribed before the proceedings closed.

The first part of a new Russian work by M. Prijevalsky, entitled "Mongolia and the country of the Tanguts," may be expected before the end of the year. It will contain an account of the author's travels in Central Asia, together with a description of the Zoological and Botanical results he has arrived at. In all, 64 species of mammalia, and 292 species of birds were obtained, including among the most remarkable of the former, the Wild Yak, the Orongo Antelope and *Ovis polii*; of the latter *Gyps nivicula* and a new species of *Pterorhinus*. The botanical collection includes, according to the botanist Maczimovitch, a great many new and rare specimens. In the mountains of Kansu about 500 different plants were obtained, including the seeds of the medicinal rhubarb.

The Cambridge Syndicate appointed to organise courses of lectures or classes with the necessary examinations in a limited number of centres of population have received applications from several places to supply teachers during the ensuing winter. Among the subjects suggested for choice are Political Economy, Mental and Moral Science, History, English Literature, Physiology, Physical Geography, Geology, Astronomy, Mechanics, various branches of Physical Science, and other subjects of a kindred character to these. The remuneration offered varies from 125*l.* to 200*l.* for the term of three months, there being two such terms to be provided for between October and May. The pupils are chiefly from among young men and women of the middle and working classes. The Syndicate request any gentleman willing to take part in such work to send his name and the statement of subjects he would be willing to give instruction in to Mr. Stuart, M.A., Trinity College, the secretary.

The Council of the Senate of Cambridge University recommend that a Demonstrator of Experimental Physics be appointed at an annual stipend of 150*l.* The duties of such person shall consist of assisting the Professor in giving class instruction and making experiments. He is to be appointed by the Professor, with the consent of the Vice-Chancellor. A discussion of this report takes place to-day.

M. J. Plateau has recently published, in two volumes, a work entitled "Statique expérimentale et théorique des liquides soumis aux seules forces moléculaires" (London: Trübner). M. Plateau has effected the realisation, on a large scale, of a part of the figures of equilibrium, indefinite in number, which would affect liquids if gravity did not act upon them; he has thus furnished the experimental verification of a series of results obtained by geometers in respect to surfaces whose mean curvature is constant, such surfaces as those of figures of equilibrium. The work referred to contains an account of the author's researches on the forms and phenomena presented by liquids in the condition named, as well as the consequences which result therefrom. The following are two examples of these consequences:—1. The froth which is formed on champagne and other liquids is evidently an assemblage of laminæ, which enclose in their interstices small portions of gas. One might naturally expect that in this assemblage all would be ruled by chance, but it is nothing of the kind; the small laminæ never unite but three and three, and make with each other, at the small liquid edge which unites them, equal angles of 120°. Moreover, the liquid edges throughout unite four and four, and thus form between them, at the point where they meet, equal angles, angles whose cosine is $-\frac{1}{3}$. 2. The beautiful observations of Savart have taught us that a vein of liquid pierced by a circular orifice is gradually converted, during the passage of the liquid composing it, into a series of isolated masses. The illustrious French physicist, to account for this phenomenon, has tried to prove that the very act of flowing gives rise, in the orifice, to pulsations which produce in the vein successive protuberances, and this hypothesis has been adopted by most of the students who have inquired into the matter. M. Plateau shows that this ingenious notion is quite insufficient to account for the facts, that the conversion into isolated masses is a result of the molecular forces which are in action at the surface of the vein, and that from this naturally result all the particulars established by Savart.

Science seems likely to be treated royally in Sweden this year. For the expenses of the Congress of Archæology and Prehistoric Anthropology, which will be held at Stockholm from Aug. 7th to 16th, the Government has asked from the Diet a grant of 20,000 fr.; a magnificent palace has been set apart for the holding of the congress; two grand fêtes will be given by the king and by the city; and visitors will be carried by the railways at half-fares. The programme includes papers and discussions on the stone age, bronze age, and iron age, and on prehistoric archæology; and excursions will be made to places of archæological interest and remains of prehistoric man in the neighbourhood. The "Congrès d'archéologie slave" will also be held at Kiew, from Aug. 14 to Sept. 3. Altogether, students of prehistoric man will have a good time of it in North Europe this summer.

The appointments to the Bureau des longitudes at Paris for 1875 are—M. Puiseux as president, M. Faye as vice-president, and M. Yvon-Villarceau as treasurer and secretary.

The French Academy is publishing a large 4to volume of 300 pages, containing all the reports and maps relating to the next Transit of Venus. A copy has been presented to each member, and the book is to be had at M. Firmin Didot's, the publisher to the French Institute.

Some carpenters are at present engaged in building in the Jardin de Luxembourg at Paris a photographic studio, for the use of the photographers who are to be sent out with the Transit expedition. The observations are soon to begin, and will be under the direction of M. Fizeau, member of the French Institute; but that gentleman will not leave Paris to follow the operations.

The young King of Siam having come of age on October 10 last, great feasts were given to his subjects at Bangkok, the chief town of his dominion. Amongst other attractions was the ascent of a small mounted balloon, which had been constructed in Paris and had arrived by steam a few days previously, Liberal offers were made to procure an aëronaut, but were of no avail, nobody amongst the Siamese presuming to ascend. Consequently his Majesty ordered a slave, selected from amongst the less heavy of his household, to be sent up in the car. In order to encourage the poor aëronaut, so frightened for his life, he was promised to be rewarded with his enfranchisement. The ascent took place and elicited much enthusiasm from the bystanders; but, unhappily, nothing was heard from the poor fellow or of the craft.

THE Universal Exhibition to be held in the Champs Élysées Palace in 1875 is merely a private enterprise; the French Government having no intention to interfere except in giving its authorisation. No charge will be made on the national Exchequer, but it is rumoured and hoped that the Municipal Council of Paris will grant a considerable sum of money.

MR. G. J. SYMONS writes to yesterday's *Times* suggesting various methods, all good, and we think practicable, of distributing daily, or even at certain intervals during each day, the accurate time throughout London. This is an advantage possessed for long by many provincial towns; though London in this, as in many other respects, is far more "provincial" than many a second-rate provincial town. We are glad to see, however, from Mr. W. Abbott's letter in the same paper, that the want complained of by Mr. Symons will soon, to some extent, be remedied; as one of the objects of the British Telegraph Manufactory (Limited), which has just taken over all the inventions of Sir Charles Wheatstone, is to establish a large electrical driving clock in a central position of the metropolis.

THE Commissioners of the Fairmount Park, Philadelphia, U.S., are making great efforts in the way of bringing together, in the form of a zoological garden, a complete collection of animals of North America, with a view of their exhibition at the approaching Centennial Exhibition. The Commissioners are also expecting considerable consignments from other parts of the world, as South Africa, South America, &c., and the whole enterprise bids fair to assume a very great magnitude.

AT a meeting of the California Academy of Sciences in November last, photographs of strange but beautiful hieroglyphics, cut in wood, and found on Easter Island, were received from Mr. Thomas Croft, of Papeeti, Tahiti. From vague traditions among the natives, they were supposed to represent the written language of some prehistoric nation. The stone idols found on the island exhibit a refined form of art, and other relics found there go to prove that the present population has gradually degenerated from a previous one. In the letter accompanying the hieroglyphics, Mr. Croft stated from the best information he could obtain, that none except the priests and a chosen few could decipher these strange characters. A letter was read from this gentleman at the last meeting, in which he stated that he had found a native of the island who could read them, and who was going to teach Mr. Croft the language, so that he will shortly be able to translate them. Mr. Croft thinks that he has discovered the relics of a great Malayan empire, which extended its power over that part of the ocean at some former period of the island's history.

"THE Treasury of Languages, a Rudimentary Dictionary of Universal Philology" (London: Hall and Co.), is an attempt at making an exhaustive alphabetical list, with brief explanations, of all the known languages and dialects of the world. It contains, besides, explanations of terms used in the science of language. The volume contains 300 pages, with an average of fifteen names on each page; this will convey some idea of the variety of tongues on the face of the earth. The author, who is nameless, but who, we are told, is a "literary amateur," moreover intimates that he has received additional material sufficient to make a second volume. What a bewildering field is before the student of languages, to whom the present work is calculated to be extremely useful.

WE have received a second and richly illustrated edition of Mr. Hartwig's "Polar World" (Longmans). The record of Arctic discovery has been succinctly brought up to the present time, and the work is well calculated to convey to the general reader a vivid, and on the whole correct, idea of man and nature in the Arctic and Antarctic regions of the globe.

PART I. of Vol. V. of the "Natural History Transactions of Northumberland and Durham" (Williams and Norgate) has come to hand. It contains the usual Annual Address of the President, Mr. H. B. Brady, F.L.S., who recounts the excursions of 1872, and touches on one or two important questions of the day, with clearness, vigour, and brightness. The following are the titles of the papers in this part:—"Note on the recent occurrence in Northumberland and Durham, of the Camberwell Beauty Butterfly," by T. J. Bold, who also contributes papers on "The Museum Collection of British Insects," and "The Occurrence of Lepidoptera in Northumberland and Durham in 1872;" "Note on Bones dredged from the bed of the river Weir in 1872," by Dr. D. Embleton; "Meteorological Report for 1872," by the Rev. R. F. Wheeler and the Rev. Dr. R. E. Hooppell; "First Instalment of a Catalogue of the more remarkable Trees of Northumberland and Durham," by Mr. G. C. Atkinson, who has devised a "hypsometer," a simple but useful instrument for ascertaining the height of trees; "Note on Cinerary Urns found at Humbledon Hill, near Sunderland."

PART III. of Vol. III. of "Proceedings and Transactions of the Novia Scotian Institute of Natural Science," has been sent us. Besides a summary of the Proceedings of the Society, it contains twelve papers of varying value on scientific subjects, eight of these being by three of the members; this Society, like many others at home apparently, having many names on its roll but few working members. Three papers are by the Rev. Dr. Honeyman, F.G.S., Director of the Provincial Museum:—"On the Geology of Nova Scotia and Cape Breton," "On the Metamorphism of Rocks in Nova Scotia and Cape Breton," and "The History of a Boulder." Of the other papers we may mention two by Dr. J. B. Gilpin on "The Eagles of Nova Scotia," and "The Stone Age of Nova Scotia;" "The Great American Desert," by Mr. H. S. Poole; and "The Vegetation of the Bermudas," by Mr. J. M. Jones, F.L.S. Appended is a brief note on the visit of the *Challenger* to Halifax.

THE "Report of the Birmingham School Natural History Society for the year 1873," is on the whole satisfactory. All the sections seem to be in good working order, their meetings fairly attended, and some profitable field-work is being done. The papers, abstracts of which are published in the report, are creditable to the young gentlemen who wrote them.

WE have received a large sheet containing Statistical Tables relating to the Colony of Victoria, compiled from official records in the Registrar-General's Office, Melbourne, by Mr. W. H. Archer, Registrar-General. The tables contain a vast amount of information, well and compactly arranged, concerning the population, industry, education, &c., of the colony. The sheet contains also the usual meteorological statistics for the twelve months of the year, and extending over a period varying from six to fourteen years.

THE additions to the Gardens of the Zoological Society during the past week include a Common Rhea (*Rhea Americana*) from S. America, presented by Mr. A. Maxwell; a Black-tailed Godwit (*Limosa melanura*), British, presented by Mr. H. Stacy Marks; a Red-faced Deer (*Cervus œnops*) and two Falcated Teal (*Querquedula fulcata*) from China, purchased; a Chinese Water Deer (*Hydropotes inermis*), a Reeves' Muntjac (*Cervulus reevesi*), and a Japanese Teal (*Querquedula formosa*) from China; a Collared Peccary (*Dicotyles tajuça*) from S. America, deposited.